Spectrum Management in the R & D Process

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Why Manage Aviation Spectrum?

Spectrum is a scarce resource which is managed by ASR in order to keep the National Airspace System functioning safely & effectively:

✈ **Prevents interference to NAS systems**

✈ **Maximizes capacity of NAS systems**

✈ **Ensures safety through use of internationally protected bands**

FAA Spectrum Policy Responsibilities

Within the Federal Aviation Administration (FAA), the Office of Spectrum Policy and Management is the sole authority for the spectrum allocation for new systems during equipment research and design as well as the FAA's single point-of-contact for coordination of operating frequencies with other Federal agencies and civil organizations.

FAA Spectrum Management Process

The FAA's role in this area of responsibility is to ensure that the frequency spectrum needs of aviation are met. The FAA element assigned this responsibility is the Office of Spectrum Policy and Management (ASR). Aviation is one of the major users of the spectrum in the United States (U.S.) Virtually all of the FAA's navigation, communications, and surveillance systems are dependent on use of the spectrum. Numerous aircraft systems are also users of the spectrum. The FAA spectrum management is carried out in two major arenas -- International and National.

FAA Spectrum Management Process

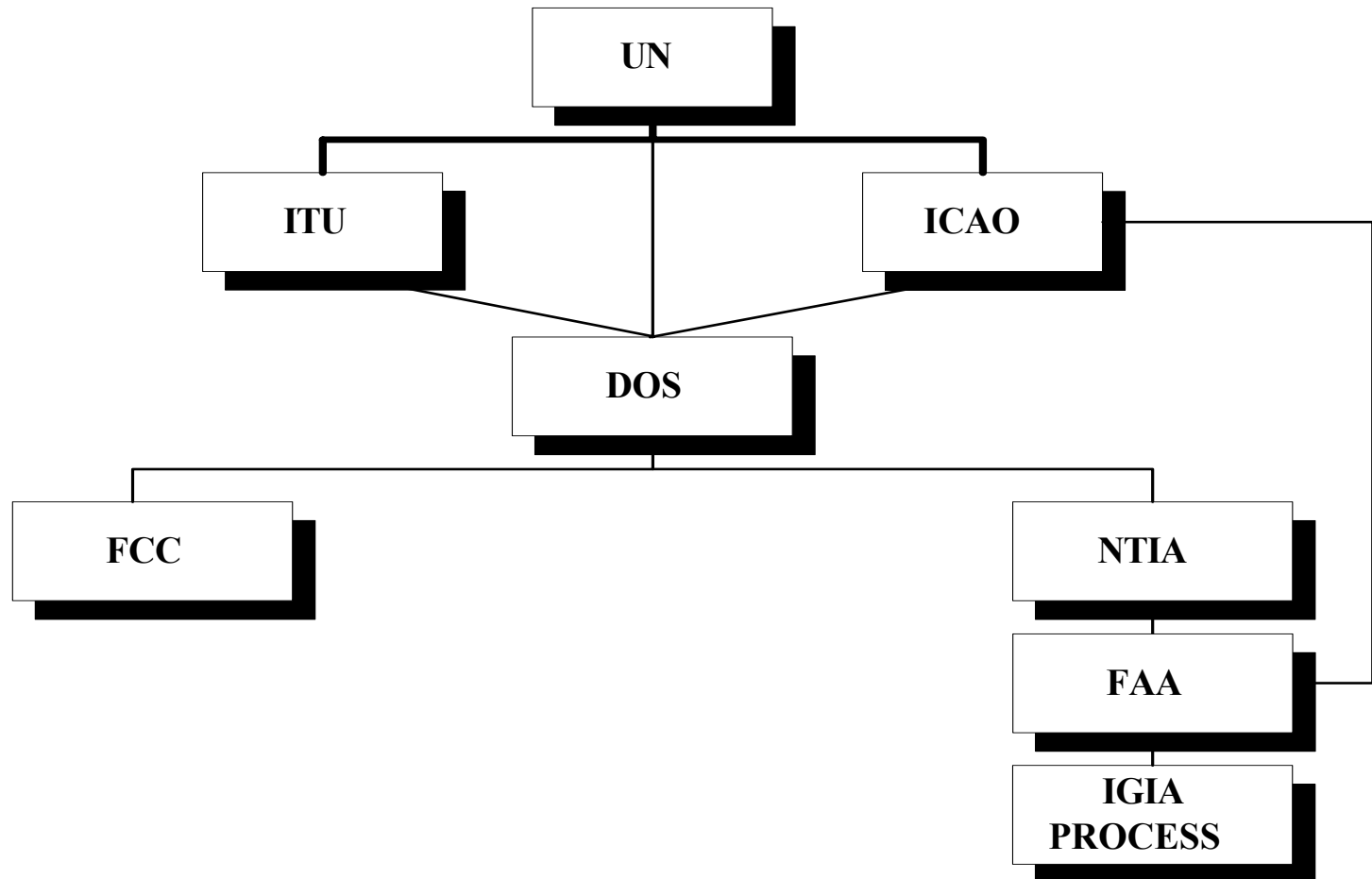| The International Spectrum Management Process	The National Spectrum Management Process
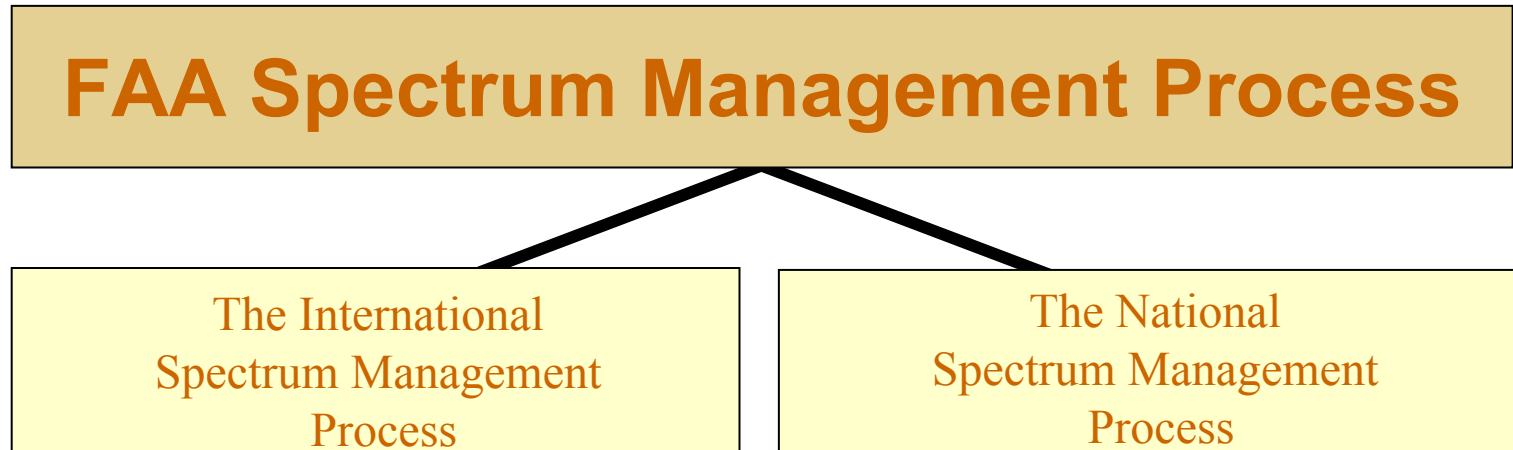
The International Spectrum Management Process

International spectrum management is governed by the International Telecommunications Union (ITU). The ITU is the oldest of the intergovernmental organizations that have become specialized agencies of the United Nations. The Union's purpose is to maintain and extend international cooperation in the development and use of all types of telecommunications. It promotes the development, improvement, and availability of technical facilities through a process of policies, regulations, and interchanges between its members. The Union strives to maintain consistency and order in international telecommunications policies and uses. Paramount to the aviation environment related to the spectrum management process is the ITU Radio Regulations, inclusive of its frequency allocation provisions, and those related to the several services operated in support of international civil aviation and dependent on the radio frequency spectrum.

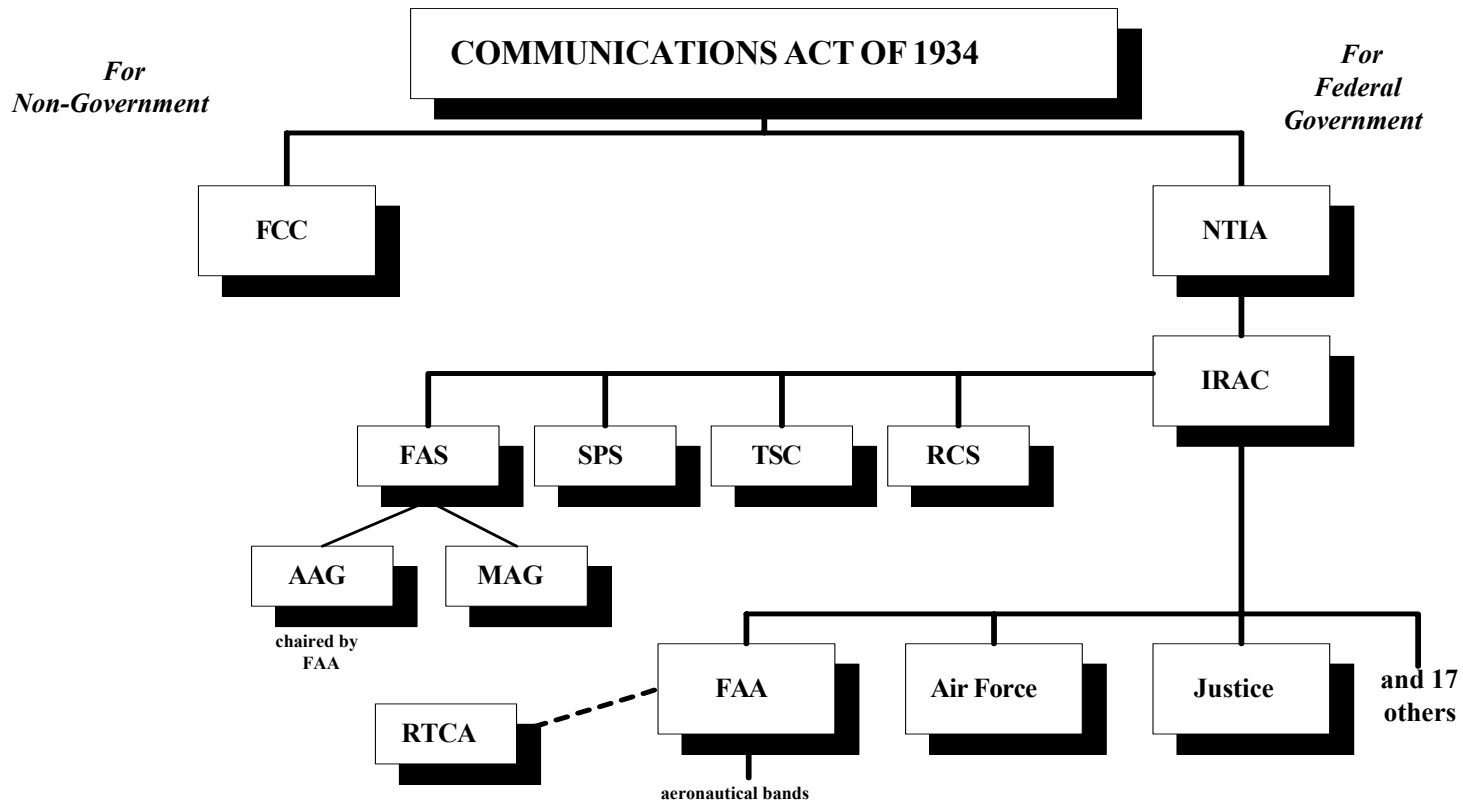# The International Spectrum Management Process

The National Spectrum Management Process

The National Telecommunications and Information Administration (NTIA) promulgates policies, regulations, and technical standards in the Manual of Regulations and Procedures for Federal Radio Frequency Management. The principal operating element for NTIA is the Interdepartment Radio Advisory Committee (IRAC). IRAC was founded in 1922 as an independent group but now operates under the auspices of the NTIA and serves as an advisory committee to NTIA.

The National Spectrum Management Process

COMMUNICATIONS ACT OF 1934

For Non-Government

For Federal Government

FCC

NTIA

IRAC

FAS   SPS   TSC   RCS

AAG   MAG

chaired by FAA

RTCA

FAA   Air Force   Justice   and 17 others

aeronautical bands

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Measures Taken to Maximize Capacity of Current VHF System

- Relaxed protection of co-channel use (from 20 dB to 14 dB)
- Reduced radio power to 10 watts to use spectrum more efficiently
- Use of voice outlets on VOR/NDB for ATIS/AWOS/ASOS
- Use of several remote communications facilities at large airports
- Use of one VHF in each sector
- Use of selective keying in large sectors
- Limit operational coverage area
- Developed special radio equipment to mitigate co-site problem
- Refined engineering techniques
- Assign ground control frequencies outside of the ground control band 121.6-121.9 MHz
- Install new BUEC sites near the primary site
- Re-engineer adjacent service volumes to accommodate new requirement ("spectrum re-packing")
- No longer protect 50 and 100 kHz channel assignments
- began use of TSV's
- adjacent channel protection reduced to 0.6 nmi
- rulemaking for 136-136.475 MHz band by ATC
- specific frequencies reserved for ATIS/AWOS/ASOS
- use of data link for some non-time critical ATS

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NEXCOM TDMA

118-137 MHz band

25 KHz

| 1 | 2 | 3 | 4 |

time slot
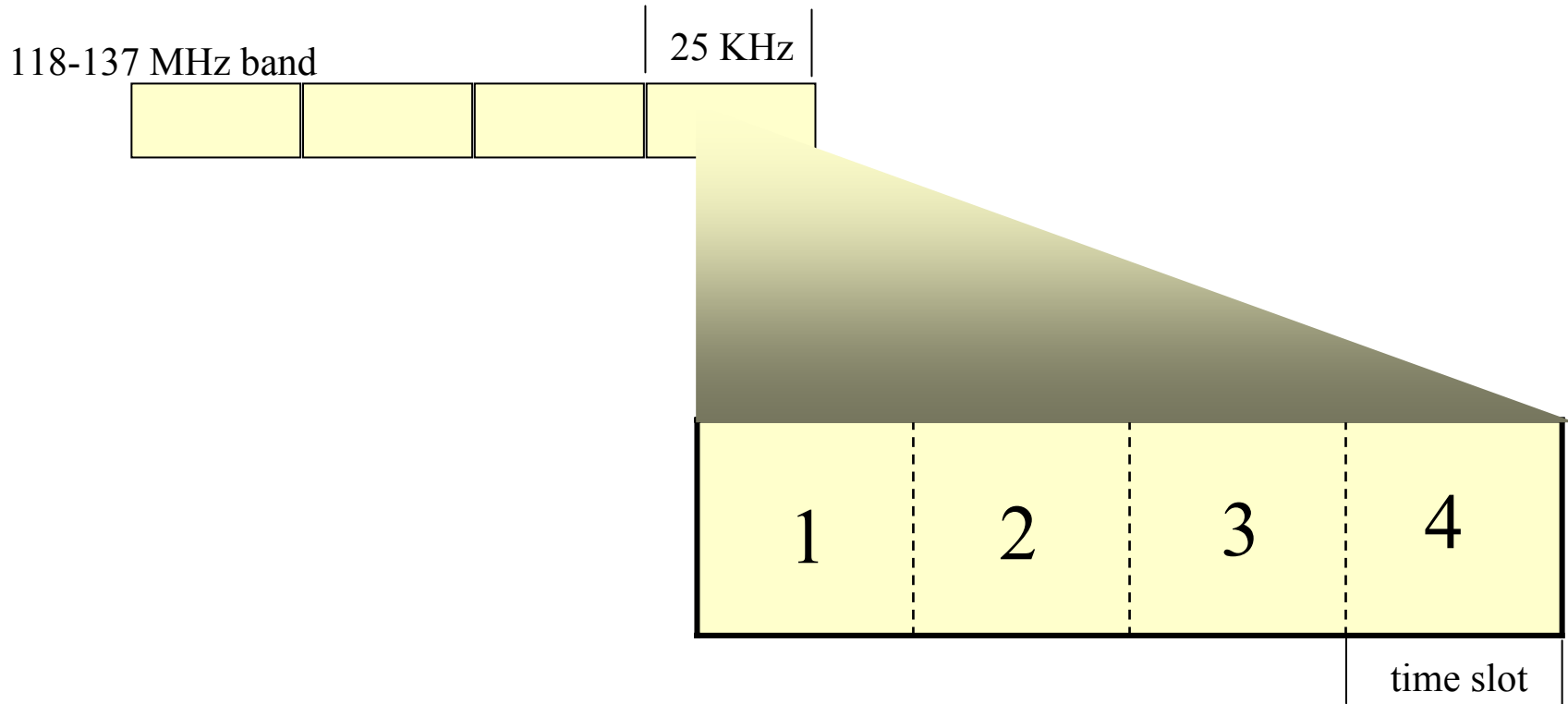
→ Increases capacity of VHF band nearly 4:1

→ Provides for digital voice and data link

→ Can be configured to support local requirements

Preserving the 5 GHz Aviation Band

Threat: Loss of 5 GHz ARNS Band

✈ **Potential loss of 5091-5150 and 5150-5250 MHz at WRC-2003**

   ✈ **Addressing additional MLS requirements in Europe**

Proposal: In parallel to MLS work, begin aviation efforts to look at:

→ **Requirement for aviation fixed-service bands**

→ **Airport area wireless LAN. Make it as flexible as possible:**

  → **Sensors to support runway incursion efforts?**

  → **Shared with public via P^3 scheme?**

    → **Help with development costs/timetables**

  → **Extended coverage to support near-airport services (e.g., 10 nmi radius for certain 1-way or 2-way data link)?**
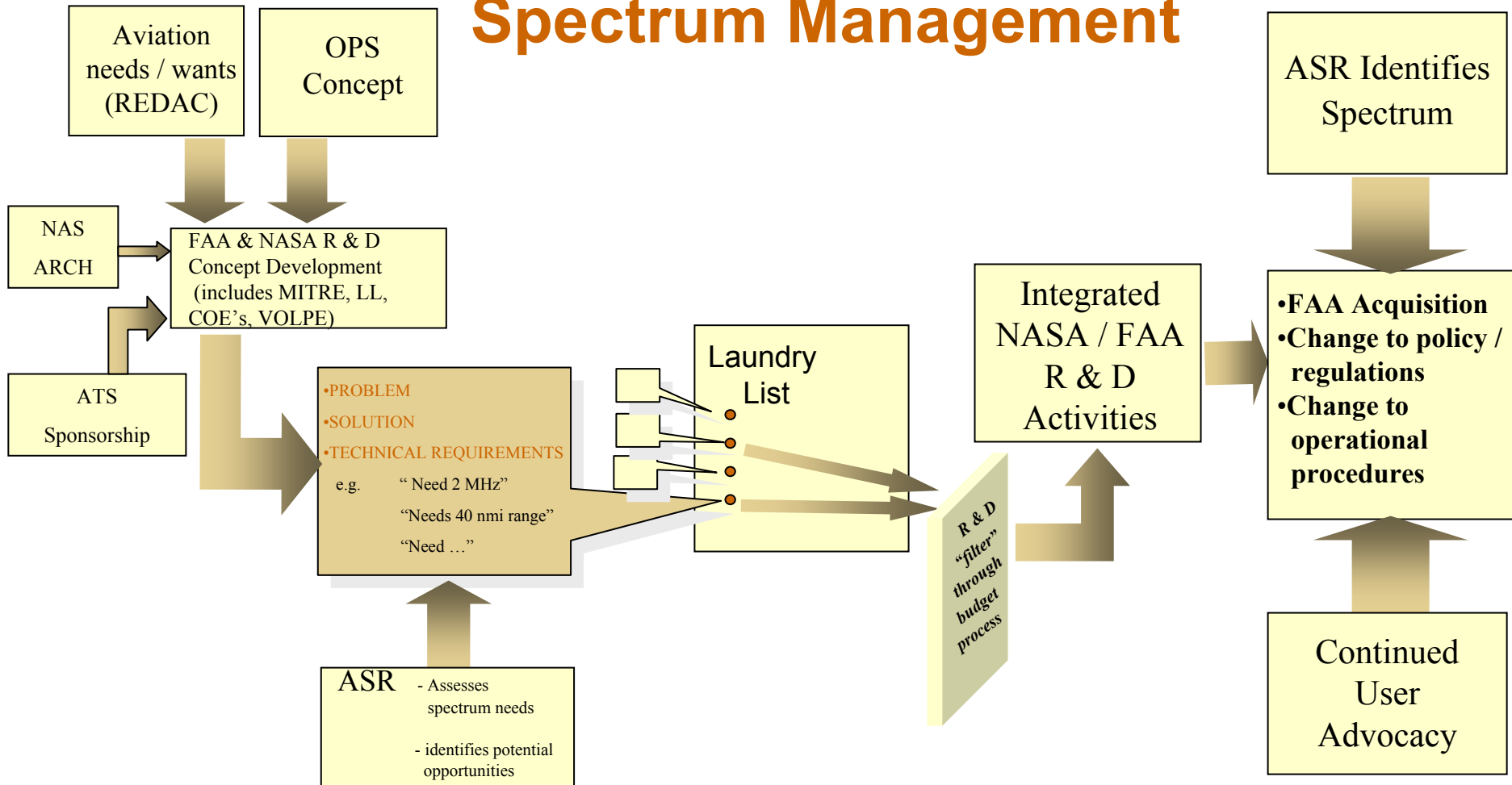
→ **Develop systems to reduce runway incursions**

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Areas of Concern

→ **Placement of synthetic vision system?**

→ **AvSTAR?**

→ **Other new systems??**

Integrating R & D Initiatives With Spectrum Management

Aviation needs / wants (REDAC)

OPS Concept

NAS ARCH

ATS Sponsorship

FAA & NASA R & D Concept Development (includes MITRE, LL, COE's, VOLPE)

- PROBLEM
- SOLUTION
- TECHNICAL REQUIREMENTS

  e.g.   " Need 2 MHz"

  "Needs 40 nmi range"

  "Need …"

ASR   - Assesses spectrum needs

- identifies potential opportunities

Laundry List

R & D "filter" through budget process

Integrated NASA / FAA R & D Activities

ASR Identifies Spectrum

- **FAA Acquisition**
- **Change to policy / regulations**
- **Change to operational procedures**

Continued User Advocacy

Benefits of Early Coordination & Integrated Planning

→ **Spectrum needs identified early and systems mapped into appropriate spectral bands**

→ **FAA/NASA/Users can speak as united front to advocate moving in the agreed upon direction (consistent with Spectrum Policy)**

→ **FAA can initiate national / international activities to support future spectrum requirements**